BEST VALUE OPPORTUNITY SCREENING PROCESS (BVOSP)

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1. BEST VALUE OPPORTUNITY SCREENING PROCESS (BVOSP)

1.1 Overview

The Department of Defense (DoD) acquisition reform initiative emphasizes finding "Best Value" alternatives to supporting major weapon systems over their lifecycle. Acquisition program managers are tasked with adopting support strategies that evaluate whether DoD sources or commercial support sources can be leveraged to provide requisite support within their programs. DoD Directive 5000.1 and DoD publication "Commercial Item Acquisition: Considerations and Lessons Learned" of June 26, 2000 further directs the use of commercial items in DoD systems as the preferred approach. The Under Secretary of Defense (Acquisition, Technology, & Logistics) issued additional guidance on 05 January 2001 that states, "Thorough market research should be conducted to develop a better understanding of the business strategy from both the government's and the contractor's viewpoints, leading to behavior that jointly achieves the mutual goals of all parties (e.g., best value acquisitions and targeting high performance based on best business practices)." These directives, however, leave the program managers to determine how the suggestions will be applied and to achieve these goals. Currently, they lack the tools and resources to develop an effective process to implement the guidance.

In the spring of 2000, Naval Sea Systems Command (NAVSEA) PMS317 LPD 17 Program Office established a research and development project to develop a best value approach to lifecycle support. A project team was established with representatives from NAVSEA PMS317, Naval Inventory Control Point (NAVICP), Assistant Secretary of the Navy (Research, Development & Acquisition) Acquisition Reform Office, Naval Surface Warfare Center (NSWC) headquarters, NSWC Port Hueneme, NSWC Philadelphia and the Litton-Avondale Alliance. NAVICP was tasked with managing the effort. Appendix A contains a complete list of participants in this effort. This is the final report for the research and development project team.

The team struggled to define the scope and application of a "Best Value Analysis" (BVA). During our analysis, we realized how many interpretations and expectations people have regarding the BVA process. Most of the instructions and guidance applies to the use of "Best Value" in the contracting process where a proposal is evaluated based upon lowest cost, technical quality, and contractor past performance. The contracting process also involves extensive preparation of a statement of work and

solicitation, evaluation of proposals and negotiation, and the eventual awarding of a contract to a specific offeror. This project recognizes the distinction between a contracting process and the need for an analysis of alternative logistic element evaluation. The approach described in this report focuses on evaluation of life-cycle support being provided by either government or industry. It is not designed to replace procedures used in the source selection process, but to facilitate the statement of work preparation by identifying performance criteria for a particular system/sub-system before the requirement is announced to the public. The end result of this research project over the past year is a Best Value Opportunity Screening Process (BVOSP). This process may be used to determine if there is an opportunity to support a system/sub-system using a commercial source (see Figure 1).

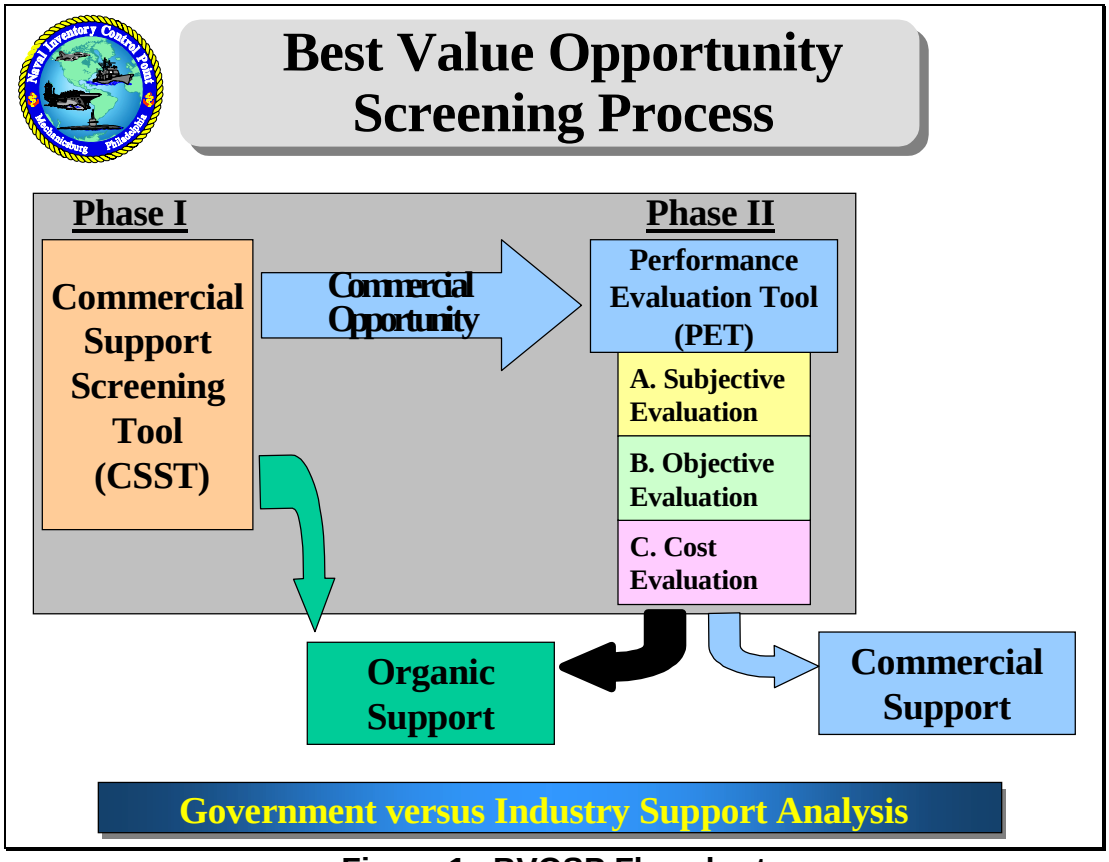

Figure 1. BVOSP Flowchart

This tool is especially useful to a contracting officer if life cycle support is to be contracted out to commercial activities. The process helps identify how support is

provided by organic infrastructure and/or industry. This comparison is essential to identifying best business practices and finding opportunities to improve performance. The screening process results can be used to develop market surveys, Statements of Work (SOW), and source selection criteria for Performance Based Logistics (PBL) contracts (Figure 2).

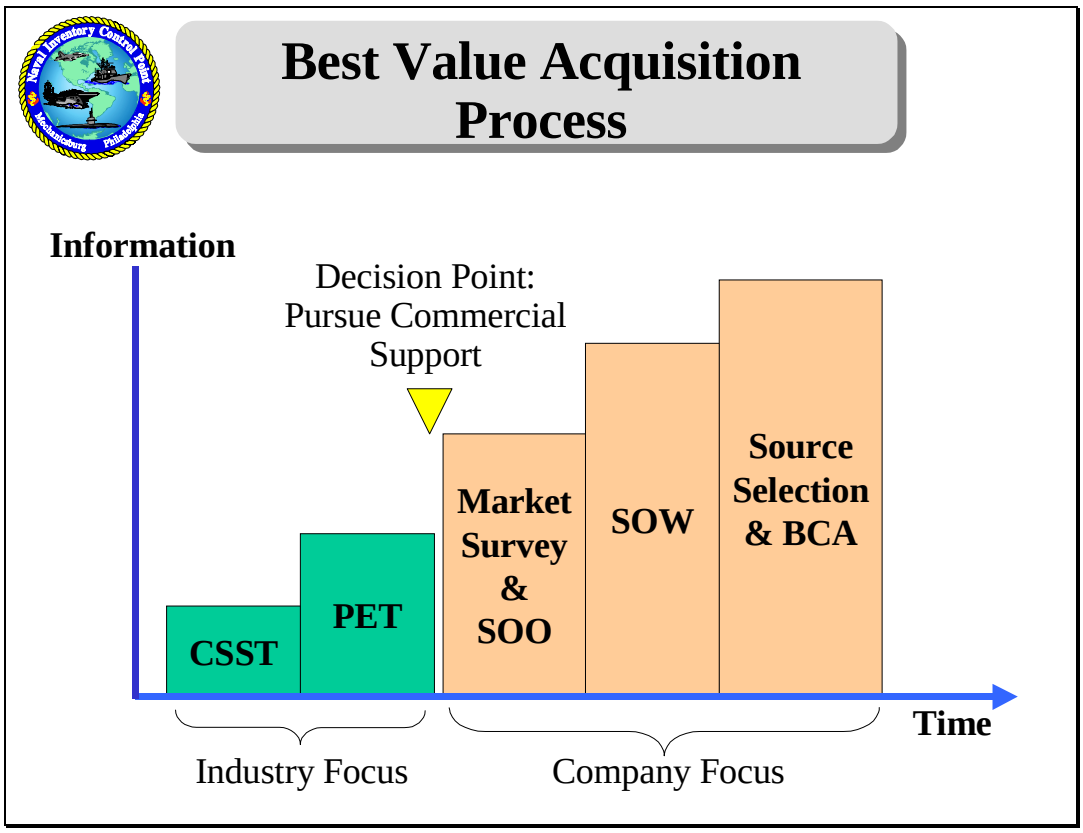

Figure 2. Best Value Acquisition Process

(Note: A list of acronyms is provided in Appendix B.)

1.2 Approach

The BVOSP focuses on a selected system/sub-system as a candidate for life-cycle support by either government or commercial sources. The intent was to develop a model that would be relatively simple to perform, would not require extensive investment in time or data gathering, and would consider all logistics elements. The resultant BVOSP uses two independent tools that provide a disciplined and impartial

approach to evaluating alternatives: the Commercial Support Screening Tool (CSST) and the Performance Evaluation Tool (PET).

The first step of the BVOSP is the CSST flowchart (Figure 3). This provides a quick method to determine if a system/sub-system is a commercial support opportunity. The CSST assumes that a new system/sub-system is not currently supported by an organic infrastructure and is, therefore, an automatic commercial support opportunity. If a system/sub-system is currently supported by organic infrastructure, and there are no external statutory issues (e.g., core requirements, environmental issues), it is evaluated using the Best Value Opportunity Index (BVOI), a component of the CSST.
The BVOI is used to gather expert opinions and plot the data in a quadrant model. It is an indicator of the relative commerciality of a specific system/sub-system.

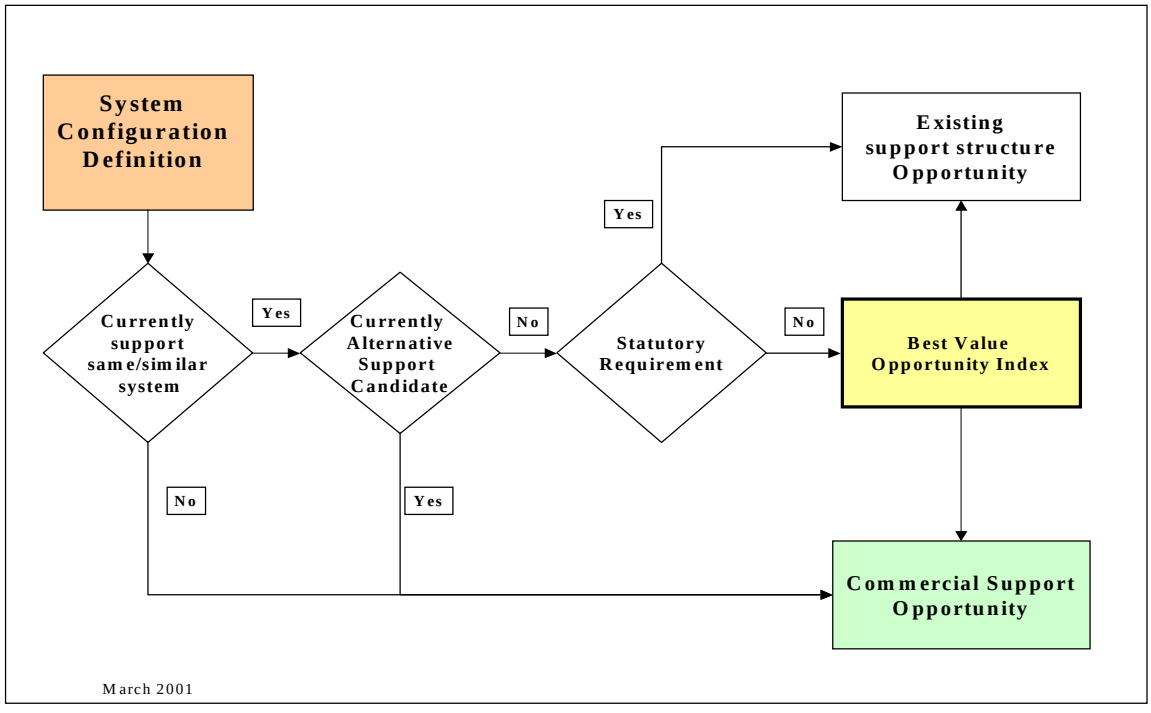

Figure 3. CSST Flowchart

If the CSST indicates a commercial support opportunity exists, the candidate system/sub-system is evaluated using the PET. The PET provides a graphical representation of how industry and government support the system/sub-system being evaluated. This tool combines three elements: a business practices matrix, comparative performance metrics, and a subjective evaluation of marketplace risk. The tool is used to identify business practices of industry and government activities to

understand both perspectives and identify differences that can be leveraged into opportunities for improvement. Knowledge of current business practices enables performance metrics to be identified as a foundation for a PBL contract. The last element of the PET is a subjective evaluation of the market risk of a specific industry. Section 3 discusses the PET process and validation results in greater detail.

2. COMMERCIAL OPPORTUNITY SCREENING TOOL (CSST)

2.1 Overview

The CSST identifies opportunities for commercial support for specific systems or sub-systems. The tool focuses primarily on screening sub-systems, but can be utilized for screening systems by aggregating the sub-systems to obtain a system level evaluation. The underlying assumption of this tool is that commercial sources for support are preferred.

Figure 3 depicts the CSST flowchart used to initially screen a system/sub-system. The first step defines the system/sub-system to provide a frame of reference for further data collection. The system/sub-system must pass a series of other screening factors before the Best Value Opportunity Index (BVOI) is employed. Use of the BVOI is applicable only if:

a. The same or similar system/sub-system is currently supported within DoD. (If this is a completely new and different system/sub-system, the assumption is there is a commercial support opportunity and it can be considered a commercial opportunity without further analysis.), and
b. There are no PBL contracts in place (or being considered) for a same or similar system/sub-system. (The assumption is that this system may be incorporated with the current contract, so that a commercial opportunity exists, and the sub-system being evaluated can be considered a commercial candidate without further analysis.), and
c. There are no statutory considerations (e.g., safety, environmental issues, or core capability requirements) that would preclude potential commercial opportunities.

2.2 BVOI Process

The BVOI (see Figure 4) is a quadrant-based model that measures the commercial sector's desire to assume support against DoD's desire to pursue outside support in lieu of traditional organic support. The vertical axis of the BVOI represents the commercial perspective and the horizontal axis the DoD perspective. Candidate systems/sub-systems are rated on the basis of five elements: uniqueness, ratio of new to existing systems, facility investment, maintenance resources, and system stability /technology change/reliability. These elements are described in more detail in Section 2.2.

High

Commercial Desire to Support		
	Likely Commercial - Common in DoD/common in commercial market - High DoD/high commercial population compared to existing population - High DoD/high commercial facility and maintenance investment - Low technology change/low reliability	Commercial - Unique in DoD/common in commercial market - Low DoD/high commercial population compared to existing population - Low DoD/high commercial facility and maintenance investment - High technology change/low - reliability
	Organic - Common in DoD/unique in commercial market - High DoD/low commercial population compared to existing population - High DoD/low commercial facility and maintenance investment - Low technology change/high reliability	Likely Organic - Unique in DoD/unique in commercial market - Low DoD/low commercial population compared to existing population - Low DoD/low commercial facility and maintenance investment - High technology change/high reliability

Low **DoD Desire for Commercial Support** **High**

Figure 4. BVOI

The BVOI is populated using Internet based GroupSystems software. This enables easy collection of varied perspectives on the five elements. The survey can be distributed using Internet based technology to experts. These experts are asked to forward the survey to others which increases the likelihood of a wider cross section of responses.

2.2.1 Overview

The BVOI rates and graphically depicts candidate systems/sub-systems as falling within one of four quadrants: Commercial, Likely Commercial, Likely Organic, or Organic. These categories provide guidance to a program office on whether or not to pursue further analysis. The following further describes the quadrant breakdown:

Commercial:

- Prime commercial support opportunity
- Undesirable for DoD to maintain or develop new support
- High commercial sector interest
- Pursuit of commercial support should proceed

Likely Commercial:

- Some ambivalence between DoD and commercial sectors
- Commercial support is a strong possibility, but less certain than those sub-systems identified as commercial
- Pursuit of commercial support should continue
- Government “Cash Cows”, i.e., moneymaker
- Good DoD opportunity to negotiate contract

Likely Organic:

- Some ambivalence between DoD and commercial sectors
- Minimal commercial support structure
- Few incentives for commercial sector
- Requires creative commercial support solution

Organic:

- Traditional items with a strong organic support structure
- Minimal commercial application
- Good DoD management
- Pursuit of commercial support not recommended

2.2.2 Element Description

2.2.2.1 Uniqueness

This element focuses on the commonality and commerciality characteristics of the system/sub-system being evaluated and the existence of military and/or commercial logistics support infrastructure. It represents the degree of commonality with other DoD systems and the degree of commerciality with similar commercial systems. If the system/sub-system design features are highly common with existing military systems/sub-systems and similar systems are currently supported within the military support infrastructure, there may be an opportunity to benefit from the associated existing organic support infrastructure. Conversely, if the system/sub-system design features are not highly common with existing military systems and the equipment is

currently supported within the commercial logistics support infrastructure, there may be an opportunity to benefit from the existing commercial infrastructure.

2.2.2.2 Ratio Of New To Existing System Populations

This element determines if the existing support system/infrastructure is able to support an additional number of systems without adding infrastructure.

2.2.2.3 Investment

Investment indicates the depth of DoD/commercial commitment. Two dimensions of investment are considered - facilities and maintenance. Facilities investment includes depots, Intermediate Maintenance Activities (IMA), training buildings, etc. Maintenance investment includes labor and equipment needed to perform maintenance above the organizational level. High investment implies a large infrastructure already exists to support the sub-system being evaluated. A greater investment may indicate that the work is more core to the facility. A lack of investment implies new infrastructure may be required to support this sub-system. It may be an element to consider in future surveys depending on the system under review. (Note: Inventory investment was considered as an element, but removed after further evaluation. It was deemed too difficult to accurately access the level of inventory costs. Complicating factors included material in pipeline, stock turn, repair parts, etc.)

2.2.2.4 Technological Change/Reliability

This element measures system and design stability. System stability refers to the amount of technological change that the system is experiencing or tends to experience due to its design characteristics. From the DoD perspective, the model assumes it is desirable to maintain organic support of stable systems with a propensity for low technological change. From the commercial perspective, the model assumes that desirability is keyed more to reliability. If the system has low reliability, there is an incentive to provide commercial support.

2.2.3 Data Collection

Internet based GroupSystems software collects data in the form of an on-line questionnaire to populate the BVOI. Appendix C contains the surveys for the two sub-systems chosen as prototypes for the BVOI process. These surveys were sent to subject matter experts (SMEs) within DoD and the commercial sector. The advantage of this method is ease of use, low cost, and the ability to reach a wide survey population simultaneously. On the e-mail cover letter, respondents are encouraged to forward the e-mail to other SMEs. The GroupSystems software allows respondents to be categorized by area of expertise and activity for which they work.

2.2.4 Model Application and Prototypes

2.2.4.1 Prototype System Identification

Table 1 depicts the two sub-systems selected to test the CSST process:

Table 1. Prototype Systems

Prototype systems	**AN/SLQ-32A(V)2** Electronic Warfare System	**MPDE** Main Propulsion Diesel Engine
Initial hypothesis	Organic	Commercial
Basis	Legacy government system with strong organic support structure	Similar to other commercial and DoD supported diesel engines

2.2.4.2 Preparation

Once the sub-systems were identified, a System Definition Sheet was prepared for each one (see Appendix D). This sheet provides baseline data for the SMEs to reference prior to taking the questionnaire. The system definition sheet was included to provide information on the sub-system being evaluated and the sub-system that was used as a basis for comparison. SMEs were obtained from program managers and the LPD 17 Program Office. The survey population was targeted to obtain a representative sample from many areas of expertise including engineers, manufacturer representatives, fleet personnel, diesel inspectors, service technicians, and program managers.

2.2.4.3 Methodology

The CSST was introduced to survey candidates through a cover letter sent via email (see Appendix E). The cover letter contained a brief explanation of the CSST, links to websites containing the system definition sheet, the GroupSystems questionnaire, and a short explanation of the purpose of the survey. Addressees were asked to review the system definition sheet before accessing the survey to understand the sub-system being evaluated. The procedures did not preclude survey respondents from accessing the survey without reviewing the system definition sheet.

Clicking on the link within the e-mail took addressees directly to the on-line questionnaire. The survey asked for identifying information for classification purposes (name, phone number, email address, work activity, and area of expertise) followed by ten questions. A text block was provided at the end of the survey for comments. All fields required a response.

2.3 AN/SLQ-32A(V)2 Results

Table 2 depicts response rates from the SLQ 32 questionnaire:

Table 2. AN/SLQ-32A(V)2 Survey Data

Date	# Sent To	# Responses
1/22 Original Letter	18	7
1/26 Follow-up Letter	11	6
Total	21 (3 new)	13 (72%)

Response rate was 72% of those surveyed. This includes three respondents not in the original survey.

- 5 of 13 respondents wrote comments
- Comments addressed evaluating legacy system
- There were 2 questions respondents considered ambiguous (since changed)
- Some responses had little consensus (as measured by the standard deviation)

2.3.1 Comments

The AN/SLQ-32 sub-system is characterized as Likely Organic based on survey results depicted in Figures 5 and 6. Figure 5 displays the aggregate votes and indicates a consensus for DoD maintaining the sub-system. Figure 6 displays the consensus of responses by elements. This is a legacy system and there is little commercial interest due to its unique military application. Although industry supports some radars, there is no commercial infrastructure to support this equipment. DoD manages this system well and survey results indicate it should stay within the government purview. Supporting this hypothesis is the vote distribution for investment, which shows little commercial infrastructure. The plot of "uniqueness" reveals the fact that the system is common within DoD, but not in the commercial sector.

The system stability plot points indicate commercial interest. However, the questions relating to this element were part of the lessons learned. The superimposed arrow on Figure 5 indicates where this element would have been plotted had the questions been phrased to accurately reflect stability of the AN/SLQ-32. (Note: System population was not plotted due to ambiguity of the original questions, rendering plot points misleading.) The sample of 13 respondents is from a wide variety of activities showing good representation. Based on these results, the original hypothesis is borne out and no further evaluation is required for this sub-system. (Note: The charts are not broken out by DoD and commercial responses as they are with the MPDE. With 13 responses, only two of which were from the commercial sector, there was no statistical relevance.)

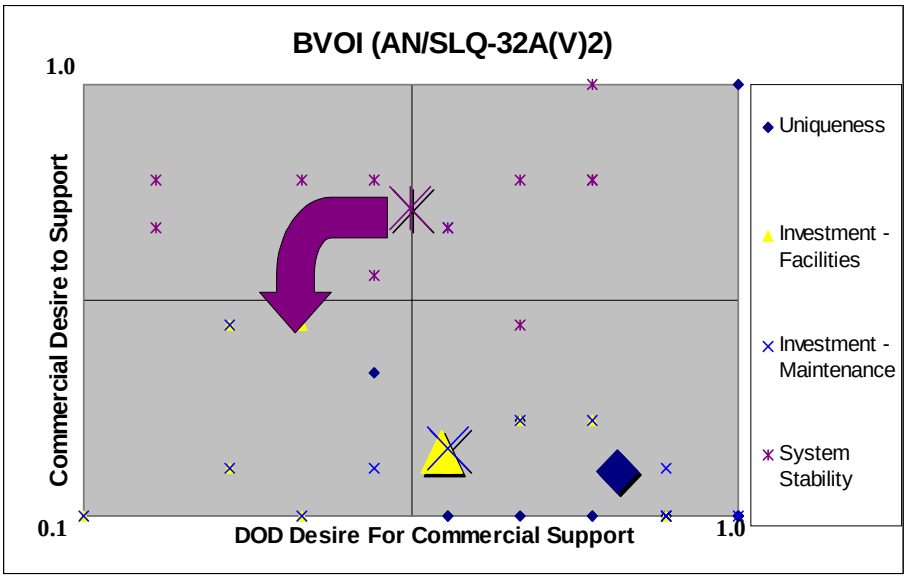

Figure 5. AN/SLQ-32A(V)2 BVOI Results

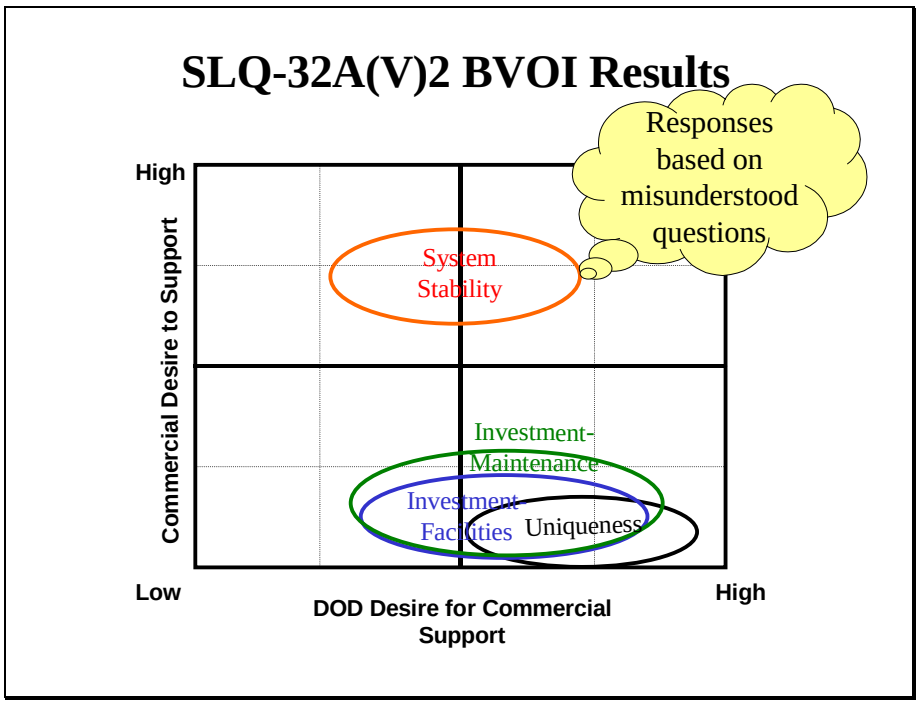

Figure 6. AN/SLQ-32A(V)2 Bubble Graph

2.3.2 Lessons Learned

a. Five of the 13 respondents selected 'other' for their work activity. Likewise, six of the 13 selected 'other' for their area of expertise even though, in both cases, the selections listed clearly fit the respondents' profile. Considering this, 'other' was deleted as an answer in the second prototype survey.
b. There was some confusion interpreting questions 8 and 9 on system population evidenced by a lack of consensus among respondents and their comments at the end of the survey. As a result, these questions were reworded for the second prototype questionnaire. Questions 8 and 9 now give clearer guidance for a numerical rating, (i.e., select '10' if system population is much higher, select '1' if much lower, and select a middle value if about the same). Responses to these two questions on the MPDE survey indicate that the intent of these questions is now clear and respondents had no problem understanding the wording.
c. The third change made to the survey was for questions 14 and 15. These questions addressed system stability and technological change. For the AN/SLQ-32, a highly reliable system with little technological change, the results indicated that there was a commercial opportunity. This was directly counter to the hypothesis for this system. These questions were modified by asking respondents to rate the relative DOD/commercial incentive to change or alter the system while considering the degrees of technological change, stability, and reliability.

2.3.3 Consensus

A smaller oval/circle in Figure 6 indicates greater consensus among responses. A larger oval/circle indicates lower consensus. For the plot of uniqueness, there was some consensus on the rating of the "commerciality" of the sub-system, and good consensus for ranking the "commonality" within DoD. For the plot of investment, there was good consensus from the commercial perspective, but little consensus from the DoD perspective for both facilities and maintenance (although less consensus in the ranking of commercial maintenance investment). For the plot of system stability, there was a lack of consensus from the DoD perspective, but good consensus from the commercial perspective.

2.4 MPDE Results

Table 3 depicts response rates from the MPDE questionnaire:

Table 3. MPDE Survey Data

Date	# Sent to	# Responses
2/6 Original Letter	46	13
2/13 Follow-up Letter	32	15
Total	68 (22 new)	28 (41%)

Response rate was 41% of those surveyed. This includes 22 respondents not on the original survey.

- 75% of responses were from Fairbanks Morse (sub-system manufacturer)
- High commercial interest
- 15% return rate for government employees
- Disappointing government response, perhaps due to cover letter not originating from the Program Office.

2.4.1 Comments

The MPDE sub-system is characterized as Likely Commercial based on survey results shown in Figures 7 through 10. The aggregate votes clearly indicate a consensus for commercial support. Commercial consensus was a result of the homogenous population responding to the survey. The ambivalence within DoD as shown in Figure 9 is likely a result of the low number of respondents coupled with the variety of activities represented. High commercial interest in this sub-system is shown in Figure 10. The original survey was sent to one representative from Fairbanks Morse. He forwarded it to others within the company generating an additional 20 responses. Although there is great interest on the part of one commercial vendor, this does not necessarily reflect industry interest in assuming support. Further evaluation (i.e., PET) is required to define the opportunity.

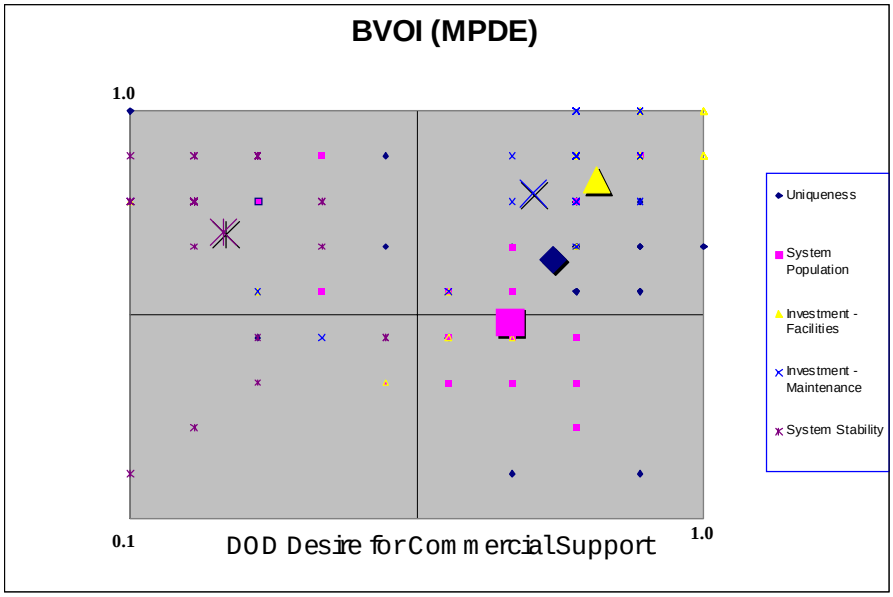

Figure 7. MPDE BVOI Results

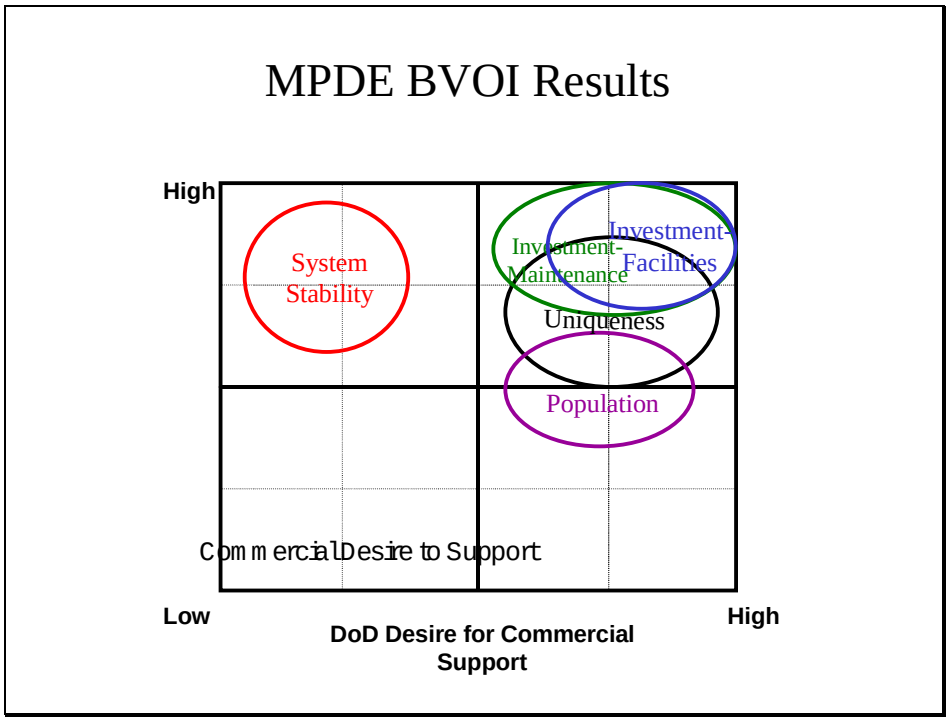

Figure 8. MPDE Bubble Graph

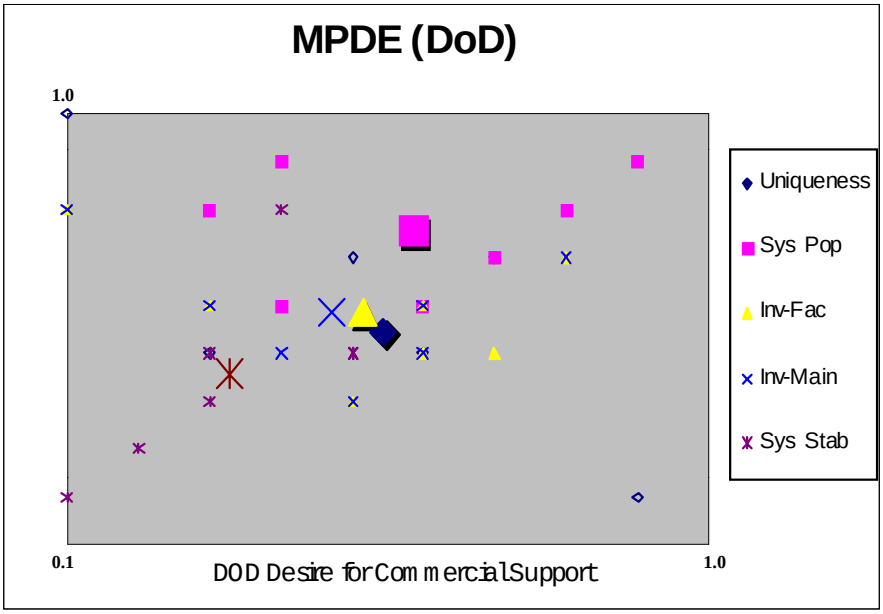

Figure 9. MPDE BVOI Results (DoD participants)

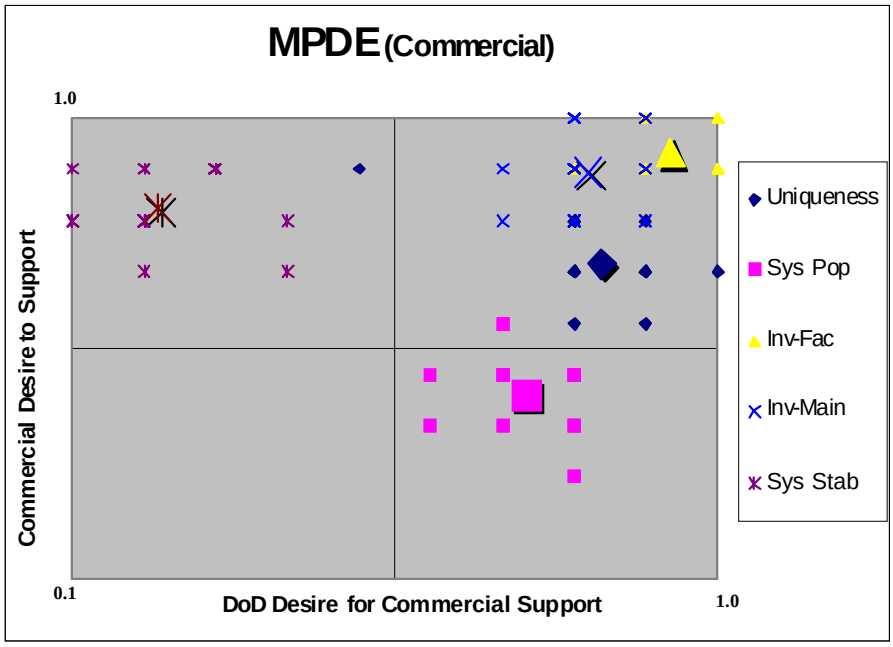

Figure 10. MPDE BVOI Results (Commercial participants)

2.4.2 Lesson Learned

When 'other' was deleted as an answer to questions 4 and 5, the comment field was not removed. This created a problem as GroupSystems considers any text in the comment field as an answer. If an activity box was checked and text was input to the comment field, an error resulted. This fact was brought to our attention via email from an engineer at FTSCLANT who completed the survey and included comments. When he selected the 'submit survey', button he received an error message telling him he must answer all questions. Since he had answered all questions he gave up and exited the system, thereby deleting his responses. After discussion with us, he removed his comments and re-submitted the survey. Future surveys should have the comment boxes deleted from questions 4 and 5. GroupSystems is not flexible enough to accept tailoring aspects relating to error messages and validation of fields. (Note: Questions should not be considered "static". They can be reworded to suit the system/sub-system under review.)

2.4.3 Consensus

The size of the bubbles in Figure 8 represents the consensus of the responses received. A smaller oval/circle indicates greater consensus among respondents, while a larger shape shows less consensus. Notable is the plotting of the system stability bubble. While the other four elements are plotted firmly and confidently in the "Commercial" quadrant (depicting a high desire on both DoD and commercial sides to commercially support this sub-system), the system stability bubble falls in the "Likely Commercial" quadrant. This indicates some ambivalence on DoD's part for commercial support, countered by a high degree of commercial interest in supporting the MPDE. This was likely due to the 75/25 mix of commercial vice DoD respondents. While DoD has little incentive to improve/change the system design, there is a high degree of commercial incentive to improve/change the MPDE design. Considering all responses, these bubbles represent good clusters and provide a high degree of confidence in the resultant hypothesis of commercial support for the MPDE. Using this process, we recommend further commercial opportunity screening for the MPDE using the PET.

3. PERFORMANCE EVALUATION TOOL (PET)

3.1 Overview

Systems/sub-systems identified by the CSST as a commercial support opportunity, require further evaluation before a determination is made to pursue commercial logistics support. The PET serves this purpose (see Figure 11). It includes an analysis of business practices, objective measures of performance and evaluates marketplace risk.

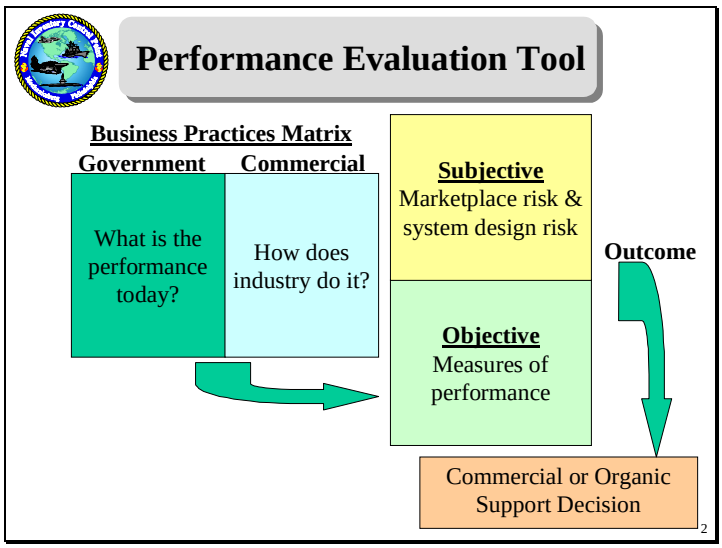

Figure 11. PET Flowchart

3.1.1 Business Practices Matrix

The first step of the PET is to complete a business practices matrix. This is a benchmarking comparison of government and commercial practices used to identify and define different support structures. The matrix focuses on "what" the performance is today, "who" performs a support function, and "how" it is performed.

Table 4 shows the matrix used to collect data and facilitate discussion. The "characteristic" column represents significant logistics elements that serve as a guideline to understand current support structures. These elements can be modified to fit the specific system/sub-system being evaluated. The discussion participants should include a group of logistics experts (supply, technical, engineering, etc) representing government and industry. A facilitator and recorder lead a brainstorming session to list and discuss current business practices. It is important to include people with a broad and in-depth knowledge of the system/sub-system being evaluated.

Table 4. PET Matrix

Characteristic	Government	Commercial
Operational Profile: Usage: Lifespan:		
Maintenance Philosophy: (to include a description of O / I / D level maintenance practices)		
Facilities: (to include repair activities at I / D levels)		
Modernization: (to include System Engineering considerations)		
Supply Support: (to include PHS&T)		
Training: (to include actual classroom, course matl, etc)		
Tech Data: (to include drawings, tech manuals, etc)		
Test and Support Equipment: (to include equipment, tools, etc)		

3.1.2 Objective Measures of Performance

The decision to pursue a commercial solution for support services at a system/sub-system level is influenced by the ability of the commercial market to improve performance at an affordable cost. The goal is to understand the differences in

performance and the associated cost of the change. By understanding the differences between current government and commercial practices, an objective analysis can be conducted. The objective analysis should focus on the factors that can be used to incentivize industry. Emphasis is placed upon those factors that can be changed and measured at a macro level. This can include both cost and non-cost factors.

The primary performance goal is system effectiveness. System effectiveness can be expressed as one or more Figures of Merit (FOM) representing the extent to which a system is able to perform the intended function. System effectiveness FOMs should consider the following:

- Availability/dependability: measure of system operating condition at one or more points during the mission.
- Operational readiness: degree to which a system is in an operable state at the start of a mission at a random point in time.
- System performance parameters: capacity, range, accuracy, etc.

Reference: (*Logistics Engineering and Management*, Fourth Edition, Benjamin Blanchard, page 22)

The objective section of the PET uses the same benchmarking format as Table 4 to capture relevant objective performance metrics. Appendix F contains the actual format and data used to evaluate the MPDE. Specific metrics considered in the PET need to be adjusted to capture the uniqueness of the system/sub-system being evaluated. The metrics selected must be measurable and indicative of improved performance. These metrics provide a basis for requirements generation and source selection in PBL contracting.

3.1.3 Subjective Evaluation

This portion of the PET depends upon a subjective evaluation of information gathered from industry trade publications, industry websites (See Appendix G), and interviews with industry representatives. A scale or relative measure was not developed for this section. It is intended to be a high level analysis using a common sense approach.

There is a level of risk associated with outsourcing the support of a system to a commercial entity. Some industries are more stable, have worldwide capabilities, or are strategically positioned to perform the support as a core market function. These industries represent less risk to the government in providing long-term support to the Fleet, whether in peacetime or during wartime surge. The more a market is unstable, however, the higher the risk to the government in establishing a long-term relationship. Figure 12 depicts market stability associated with industry characteristics.

Understanding the market risk will help a decision-maker evaluate the degree of risk the government is willing to accept in an outsourcing arrangement. The system design features introduce unique risk that should also be considered. If the system is mission critical, it is more likely the government will require a safety factor to ensure requirements are filled.

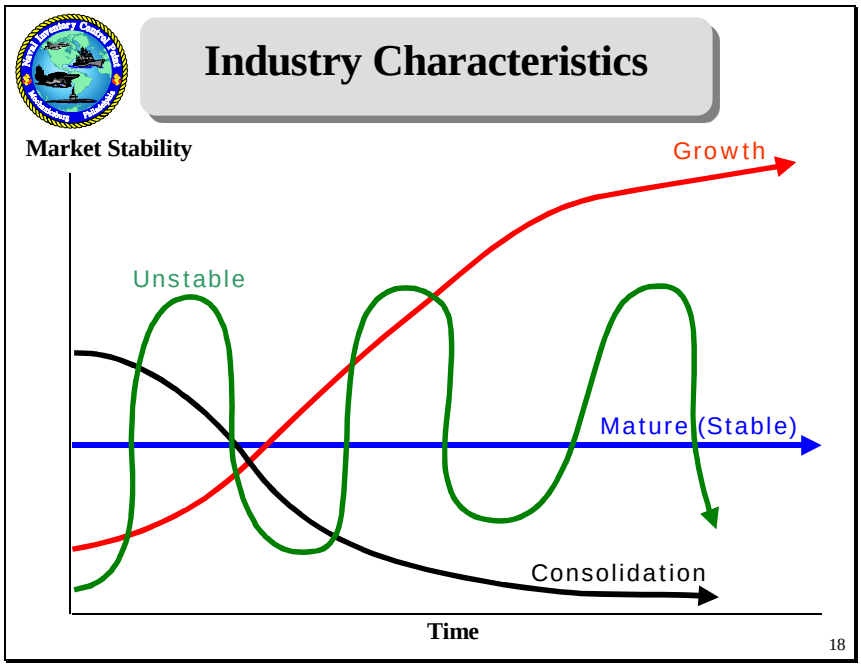

Figure 12. Industry Characteristics

3.2 PET Validation Using MPDE

The LPD 17 MPDE was selected as the sub-system to validate the PET based upon the results of the CSST process. The primary goal of the validation was to test the screening process using the tools developed for this project. Another benefit of the validation was the identification of recommendations for specific opportunities to support the LPD 17 MPDE.

3.2.1 Meeting Overview

The first step in the validation was the formation of a team of diesel industry experts from both government and industry. Specific individuals were identified and asked to participate in a two-day discussion. People were willing to participate without travel reimbursement or compensation because of the R&D nature of the project. However, future use of a team meeting approach will require funding for those who are not within an immediate area.

The meeting attendees represented appropriate MPDE government and commercial technical and logistical subject matter experts. They are:

CDR Scott Thon	Facilitator
Tom Stehr	NSWCCD
Jim Fry	NSWCCD
Mike Lalumiere	NAVICP-Mechanicsburg
Rob Pottinger	NAVSEALOGCEN
Grant L. Graeber	Fairbanks Morse Engine Division
Tim Severino	Recorder

A relatively small group was selected because of the ease in arranging a meeting date and to avoid lengthy discussions. Depending upon the system/sub-system being evaluated, additional expertise may be necessary to capture additional ideas and insight. The team leader must make the trade-off decision between quantity and quality of participants.

A facilitator and recorder were provided to allow the participants to focus on the topic. The facilitator encouraged an atmosphere of candid and insightful interaction pertaining to government and commercial MDPE Integrated Logistic Support (ILS) postures. Three large whiteboards enabled brainstorming ideas to be displayed and effectively discussed.

The meeting began with a brief explanation of the process being used, the purpose of the PET, and ground rules. The discussion order using the PET structure was: business practices matrix, performance metrics, and subjective risk. Ideas and issues that did not fit into any category were captured on a separate white board for later consideration. The discussion was recorded in the MPDE PET matrix (see Appendix F.) The matrix allows the analyst to compare and contrast the support structures of government and industry.

3.2.2 Significant Observations

3.2.2.1 Operational Characteristics

It is difficult to compare US Navy and commercial shipping MPDE operating profiles because of the inherent differences of their missions and philosophy. It was agreed that the commercial sector could be broken down to cruise line ships and freighters. The cruise line ships place a high priority on being able to get underway on time and operate at medium/high speeds when transiting between ports. A freighter ship typically operates at high speed with less maneuvering between ports. Navy ships cover the spectrum of speed and maneuvering. When doing amphibious operations, they

normally operate at slow speeds within a small geographic area. The MPDE Annual Operation Hours (AOH) per engine is 2000 hours compared to 4000 hours for engines on commercial ships. The US Navy ships also have greater operational variability because of the redundancy in the number of engines on board, different operating philosophies of Commanding Officers, and varied Fleet direction.

3.2.2.2 Maintenance Philosophy

Commercial vessels have a loosely defined shipboard maintenance philosophy that is focused on ensuring that appropriate shipboard Preventive Maintenance System (PMS) is performed to maintain the Original Equipment Manufacturer (OEM) warranty standards. The OEM and/or contract ship repair and maintenance companies are relied upon to perform all major repairs and do not distinguish between intermediate and depot maintenance level. The highly consistent operating schedule of the commercial vessels is conducive to annually performing OEM planned maintenance.

US Navy shipboard maintenance philosophy is highly defined and institutionalized. Structured PMS is performed to ensure operational reliability. Intermediate and depot levels are clearly defined, but the OEM may be tasked to perform intermediate repairs contingent on Intermediate Maintenance Activities (IMA) workload and accessibility circumstances. The structure of US Navy organic repair infrastructure sometimes contributes to fragmented maintenance practices and inefficiencies. It was noted that repair actions varied among activities located on the East Coast, West Coast and Japan. On the East Coast, most repair activity is contracted out to local firms, vice the West Coast, where the IMA typically performs in house repairs.

3.2.2.3 Supply Support

The Onboard Repair Part (OBRP) selection for commercial ships is not solely based on shipboard maintenance capabilities or PMS. Shipboard spares are also selected on the basis of having a critical spare immediately available to fix a catastrophic failure regardless of the shipboard capabilities. Therefore, more bulkhead and end item spares are prevalent on commercial ships. All other spares not located on the ship are owned and stored by the OEM, or are obtained on an “as needed” basis from third-party vendors. The OBRPs contained on US Navy ships are stocked solely on the basis of the shipboard maintenance capability. All spares are owned and stored by the US Navy.

The government, through the Defense Logistics Agency (DLA), has a corporate contract with the OEM to provide material for approximately 95% of the associated line items. The remaining 5% are managed by the NAVICP – Mechanicsburg. These items in wholesale inventory are considered to be slow movers and in long supply. In addition, the government is not capturing actual demand because commercial repair activities go

directly to the OEM for the item. This is an inefficient and costly practice.

Depot Level Repairables (DLR) are not used by commercial industry. Through the use of phased maintenance, components are repaired or replaced on site when required. This eliminates the need to have multiple repairables available to perform a scheduled overhaul, similar to US Navy practice. Adopting a phased or condition based maintenance philosophy, could be an opportunity to adopt a commercial practice and potentially eliminate or reduce the need for MPDE related DLRs.

3.2.2.4 Technical Assistance

In the commercial sector, OEM is used for all technical assistance. The ship owner is not concerned with configuration management or repair analysis. This responsibility is normally left with the supporting ship repair contractor or OEM.

US Navy uses both organic infrastructure and OEM for technical assistance. The Naval Surface Warfare Center, Philadelphia has the technical authority for diesel engines. Changes to configuration are reviewed and approved by NSWC engineers and logisticians.

3.2.2.5 Performance Metrics

The Operational Availability (A(o)) of a system is defined as the probability that a system is capable of performing its specified function when called for at a random point in time. It is Navy policy that A(o) is the primary measure of material readiness for weapon systems and equipment. (OPNAVINST 3000.12) The truest measure of A(o) is expressed in the formula:

A(o) = Uptime/Total time or **Uptime/Uptime + Downtime**

Operational availability is not a useful measure between government and industry due to deviation in operating styles and readiness assessment interpretations. However, during our discussion, the consensus of the group believed that A(o) can be used to develop performance expectations if an existing system's data is available. In this case, we looked at LSD 41/49 class ships.

A(o) was calculated by Naval Sea Logistic Center (NAVSEALOG) for MPDE on both LSD 41-48 and LSD 49-52 ships. The information was obtained from the 3M data system using the applicable APLs and JCN. The LSD 41-48 represents eight years of data (1993-2000) and LSD 49-52 represents two years (1999-2000). These periods were used because they represented full years of operation for the engines.

DOWNTIME FOR MAINTENANCE

Mean Shipboard Downtime (MSBDT) is calculated using 3M detailed reports, assuming the only downtime impacting A(o) are maintenance actions where the status code equals “2” (non-operational). Preventive maintenance is therefore excluded.

LSD 41 MSBDT = 31225/773 = 40.39

LSD 49 MSBDT = 1324/36 = 36.72

Mean IMA Downtime (MIMADT) assumes that all IMA downtime will affect availability. Data from the Maintenance Summary Report is used to determine total IMA man-hours.

LSD 41 MIMADT = 50029/7894 = 6.34

LSD 49 MIMADT = 2323/427 = 5.44

MEAN LOGISTICS DELAY TIME (MLDT)

MLDT is very difficult to calculate. It is a function of two factors; percentage of equipment failures requiring parts and the time it takes to get needed parts when required.

OPNAVINST 4441.12B provides the logistics support delay time goals:

On board delay time = 2 hours
System delay time = 450 hours (MRRT)

LSD 41 MLDT = 261297/7894 = 331 hours per action
LSD 49 MLDT = 142280/427 = 333 hours per action

MEAN TOTAL TIME (MTT)

Mean Total Time = Total Time/ # of status code 2 maintenance actions

LSD 41 MTT = 2 yr (8760 hr per yr) 8 ships/ 773 = 560640/773 = 725.28
LSD 49 MTT = 70080/36 = 1946.67

MEAN TIME BETWEEN FAILURE (MTBF)

MTBF = MTT – MSBDT – MIMADT – MLDT

LSD 41 MTBF = 725.28 – 40.39 – 6.34 – 331 = 347.55

LSD 49 MTBF = 1946.67 – 36.77 – 5.44 – 333 = 1571.46

OPERATIONAL AVAILABILITY A(o)

A(o) = MTBF/ MTBF + MSBDT + MIMADT + MLDT

LSD 41 A(o) = 347.55/ (347.55 + 40.39 +6.34 + 331) = **47.9%**

LSD 49 A(o) = 1571.46/ (1571.46 + 36.77 + 5.44 +333) = **80.7%**

LPD 17 MTBF for the MPDE is 3,300 hours and MTTR is 13.0 hours per the ship's construction contract, attachment J-0018. Using the formula for A(o) for LSD 41 and replacing the MTBF factor with the LPD 17 MPDE figure, the A(o) could be 90%. This assumes that the design of the engine is far superior to a similar engine operating on the LSD 41 Class ships. In fact, the target MTBF is an improvement by a factor of two from what is currently being achieved on LSD 49 (CV) class ships. (Note: MTBF and MTTR for the LPD 17 are design goals whereas the figures for the LSD 41-49 are actual results.)

Once a baseline A(o) is calculated, it can be used to identify areas for improvement. There is no "cookbook" approach to analyzing all the factors that make up and impact A(o). Understanding and agreeing on the factors that comprise the A(o) formula is essential to using A(o) as a performance metric for life-cycle support.

Other performance metrics, such as fuel consumption rate and lube oil consumption rate, are receiving more emphasis within the commercial shipping industry. These areas are not traditionally addressed as opportunities for improvement through a PBL solution by the government. Government normally focuses on improvements that make maintenance actions easier. During our discussion, it was noted that there is a potential opportunity to leverage improvements being developed for the commercial shipping industry. During the contracting process, the commercial diesel engine life-cycle support contractor should be provided incentives to improve fuel oil and lube oil consumption rates, with potential incentive to share in the cost savings.

Emissions control is another area that was identified as a potential opportunity to provide incentives for improved performance. Marine operators in the United States are regulated by two statutes – the Clean Air Act and Annex VI to the International Convention of Pollution from Ships (MARPOL). Further regulations are being enacted to reduce emissions of nitrous oxides, total hydrocarbons, carbon monoxide and particulate matter. These issues could become significant operational considerations in the future.

3.2.2.6 Subjective Risk

The diesel engine industry is evaluated as being low risk to the government. The diesel industry includes the manufacturer and support for diesel engines used in maritime, land vehicles and industrial facilities. In our analysis, we have only considered the segment of the industry that supports maritime applications. The industry has been relatively stable for the past 100 years. Improvements have been made to the efficiency and effectiveness of diesel engines, but the fundamental principles have remained constant.

The strategic vision of the industry is moving to expand beyond simply manufacturing the engines, to a full service support arrangement. Due to the technical nature of the engines, the complicated repairs can only be performed by the OEM. It is reasonable to believe that the industry will continue to develop, manufacture and support diesel engines in the future.

3.2.3 Recommendations/Conclusions – MPDE Validation

The PET identified opportunities and facilitated an understanding of the differences between commercial and government support of the MPDE. Consensus of the team was that the government would potentially benefit from a full service partnership with a company in the diesel engine industry. The specific details of the partnership should be developed through requirements generation and contract negotiations with industry representatives. The cost and funding issues for a commercial proposal might present roadblocks to establishing a full partnership. However, contract development and cost proposals should be the next step. That process will help the program decision makers determine if commercial life-cycle support is the “Best Value” to the government. Recommendations and observations are:

a. MPDE sub system is an ideal candidate to pursue commercial life-cycle support. The effort should incorporate the MPDEs on LSD 41 and LPD 17 class ships.
b. Usage of government and industry representatives was beneficial for identifying differences and opportunities.
c. An electronic systems/sub-systems should be used to further test the process.
d. Conditioned based maintenance concept used by commercial ships may reduce the need for rotatable pool repair assets.
e. Fuel consumption rate, emissions control and lube oil consumption rate are performance metrics that can be used to incentivize a contractor to improve system support.
f. A(o) is a difficult performance metric to use when comparing commercial ships with Navy ships. Data from LSD 41 class ships, however, is available and can be used as a baseline for the LPD 17 MPDE.

4. SUMMARY

The overall conclusion of this report is that the Best Value Opportunity Screening Process can be used effectively to identify systems/sub-systems that are candidates for commercially provided life-cycle support. The methodology and tools developed offer the decision maker the flexibility to perform a high level analysis with minimal investment of time and resources. Users of the process must understand that these tools do not address all of the possible issues that need to be resolved. The principle is to establish a starting point to perform further evaluation. Specific requirements and cost information will still need to be identified and evaluated to increase the confidence in a solution.

The process is flexible, relatively easy to use, and can be tailored for screening a variety of systems/sub-systems throughout DoD acquisition programs. If used early in the acquisition process, greater management attention can be focused on establishing the best support for a particular system. The process should require approximately three months to complete all the steps. Complex systems will require more time. The organization that is given responsibility for administering the process should be independent and knowledgeable of the systems/sub-system being evaluated.

The process described in this report should be viewed as just the beginning. With additional research and development, the process has the potential to add significant value to systems/sub-systems support decisions. Use of these tools will further help achieve the Navy's acquisition reform goals for improved efficiency and effectiveness of our life-cycle support structure.

APPENDIX A - PROJECT PARTICIPANTS

This project involved several people from many different organizations. Everyone added in some way to the success of the project. The following is a list of the primary contributors. It is hard to recognize each individual for his particular contribution. Needless to say, everyone's input was greatly appreciated.

NAVSEA PMS317 Sponsors

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John Brennan
Harvey Speight

NAVSEA PMS317 Leads

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Lee Graeber	Fairbanks Morse Engine Division
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Enoch Bentley	FOSSAC Price Fighters
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Michael Bridgman	Logistics Management Institute
Sam Barnes	NAVICP-Mechanicsburg
Gene Below	NAVICP-Mechanicsburg
Mike Laulumiere	NAVICP-Mechanicsburg
Mike Mertle	NAVICP-Mechanicsburg
Mike Sim	NAVICP-Mechanicsburg
Rob Pottinger	NAVSEALOG
Phil Fulkerson	NAVSEALOG
Kim Bryce	NSWCPH
Adam Nave	NSWC HQ
Gus Milbach	NSWCCD
Chuck Simmons	NSWCCD
Jim Fry	NSWCCD
Tom Stehr	NSWCCD
Charlie Campo	PMS317
Don Courchene	TMA
Richard Holtz III	TMA

APPENDIX B - ACRONYMS

Acronym	Definition
A(o)	Operational Availability
AOH	Annual Operation Hours
BCA	Business Case Analysis
BVA	Best Value Analysis
BVOI	Best Value Opportunity Index
BVOSP	Best Value Opportunity Screening Process
CSST	Commercial Support Screening Tool
DLA	Defense Logistics Agency
DLR	Depot Level Repairables
FOM	Figures of Merit
ILS	Integrated Logistic Support
IMA	Intermediate maintenance Activities
MIMADT	Mean IMA Downtime
MLDT	Mean Logistics Delay Time
MSBDT	Mean Shipboard Downtime
MTBF	Mean Time Between Failure
MTT	Mean Total Time
NAVICP	Naval Inventory Control Point
NAVSEALOG	Naval Sea Logistic Center
NSWC	Naval Surface Warfare Center
OBRP	Onboard Repair part
OEM	Original Equipment Manufacturer
OJT	On the Job Training
PBL	Performance Based Logistics

Acronym	Definition
PET	Performance Evaluation Tool
PHS&T	Packaging, Handling, Shipping and Transportation
PMS	Preventive Maintenance System
SOO	Statement of Objectives
SOW	Statement of Work

APPENDIX C - BEST VALUE OPPORTUNITY SURVEYS

Best Value Opportunity Survey

You are being asked to participate in this survey which will be used to determine future support for the **AN/SLQ-32A(V)2**. Please answer all questions to the best of your knowledge.

To record your response, select the number from the pull-down menu. This format requires that all questions be answered. If you are unsure of a particular response take an educated guess. If you do not feel qualified to complete this survey we request you email the URL to someone who may be better suited to answer these questions.

Space is provided at the end of the survey for comments or suggestions. All responses will be kept strictly confidential. We do request you provide your name and phone number in the unlikely event follow-up clarification is needed.

Point of Contact for this questionnaire is Jan_E_Marinaro@ICPMECH.NAVY.MIL. Phone 717-605-1712

Demographic Information

1. Name:
2. Email address:
3. Phone Number:
4. Activity:

Mark 1

   a. NAVSEA
   b. NAVICP
   c. NSWC
   d. PAC Fleet
   e. LANT Fleet
   f. Litton-Avondale/Bath Iron Works

g. System/Sub-System Manufacturer
h. Raytheon
i. Other

Enter more information about this choice: _____

5. Area of Expertise:

Mark 1

a. Engineer
b. Maintenance
c. Supply
d. Training
e. Contractor
f. User
g. Other

Enter more information about this choice: _____

COMMONALITY/UNIQUENESS: This element focuses on the common or commercial characteristics of the equipment being evaluated (system, sub-system, or component) and the existence of military and/or commercial logistics support infrastructure.

6. Within DoD, what is the degree of commonality with other systems? (Rate from 1 to 10, with 10 the highest degree of commonality. If this system is unique to DoD, assign a rating of 1).

10 9 8 7 6 5 4 3 2 1

7. Within the commercial sector, what is the degree of commonality with other systems? (Rate from 1 to 10, with 10 the highest degree of commonality).

10 9 8 7 6 5 4 3 2 1

SYSTEM POPULATION: This element will be used to determine if the existing support system infrastructure can handle additional systems without adding infrastructure.

8. Compared to the existing DoD population, what is this system's population? (Rate from 1 to 10, with 10 the highest system population).

10 9 8 7 6 5 4 3 2 1

9. Compared to the existing population in the commercial sector, what is this system's population? (Rate from 1 to 10, with 10 the highest system population).

10 9 8 7 6 5 4 3 2 1

CURRENT INVESTMENT: This element will be used to evaluate the degree of government or commercial commitment. A greater investment may indicate the work is more core to the facility.

10. What is the current DoD expenditure for FACILITIES to support this system? Consider training facilities, maintenance areas, and warehouses. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

11. What is the current commercial expenditure for FACILITIES to support this system? Consider training facilities, maintenance areas, and warehouses. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

12. What is the current DoD expenditure for MAINTENANCE capability and capacity in support of this system? Include planning, tasks, and support equipment for I and D levels. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

13. What is the current commercial expenditure for MAINTENANCE capability and capacity in support of this system? Include planning, tasks, and support equipment for I and D levels. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

SYSTEM STABILITY: The following questions address the degree of system/sub-system design stability and reliability. Grading may depend on the type of system - mechanical or electronic. System stability will affect the possibility for technological insertion and reliability improvements.

14. What is the degree of technological change this system is experiencing or tends to experience due to its design? (Rate from 1 to 10, with 10 representing the most change).

10 9 8 7 6 5 4 3 2 1

15. To what degree is this system considered reliable? (Rate from 1 to 10, with 10 representing the most reliable).

10 9 8 7 6 5 4 3 2 1

Comments/Suggestions:
16. Click in the box to enter text:_____

Best Value Opportunity Survey

You are being asked to participate in this survey which will be used to determine future support for the **Main Propulsion Diesel Engine**. Please answer all questions to the best of your knowledge.

To record your response, select the number from the pull-down menu. This format requires that all questions be answered. If you are unsure of a particular response take an educated guess. If you do not feel qualified to complete this survey we request you email the URL to someone who may be better suited to answer these questions.

Space is provided at the end of the survey for comments or suggestions. All responses will be kept strictly confidential. We do request you provide your name and phone number in the unlikely event follow-up clarification is needed.

Point of Contact for this questionnaire is Jan_E_Marinaro@ICPMECH.NAVY.MIL. Phone 717-605-1712

Demographic Information

1. Name:
2. Email address:
3. Phone Number:
4. Activity:

Mark 1

a. NAVSEA
b. NAVICP
c. NSWC
d. PAC Fleet
e. LANT Fleet
f. Litton-Avondale/Bath Iron Works
g. System/Sub-System Manufacturer

Enter more information about this choice: _____

5. Area of Expertise:

Mark 1

a. Engineer
b. Maintenance
c. Supply
d. Training
e. Contractor
f. User/Operator

Enter more information about this choice: _____

COMMONALITY/UNIQUENESS: This element focuses on the common or commercial characteristics of the equipment being evaluated (system, sub-system, or component) and the existence of military and/or commercial logistics support infrastructure.

6. Within DoD, what is the degree of commonality with other systems? (Rate from 1 to 10, with 10 the highest degree of commonality. If this system is unique to DoD, assign a rating of 1).

10 9 8 7 6 5 4 3 2 1

7. Within the commercial sector, what is the degree of commonality with other systems? (Rate from 1 to 10, with 10 the highest degree of commonality).

10 9 8 7 6 5 4 3 2 1

SYSTEM POPULATION: This element will be used to determine if the existing support system infrastructure can handle additional systems without adding infrastructure.

8. Is this a high or low system population compared to the existing MPDE DoD population? (If much higher select 10; if much lower select 1; if about equal select a middle value.)

10 9 8 7 6 5 4 3 2 1

9. Is this a high or low system population compared to the existing MPDE population in the commercial sector? (If much higher select 10; if much lower select 1; if about equal select a middle value.)

10 9 8 7 6 5 4 3 2 1

CURRENT INVESTMENT: This element will be used to evaluate the degree of government or commercial commitment. A greater investment may indicate the work is more core to the facility.

10. What is the current DoD expenditure for FACILITIES to support this system? Consider training facilities, maintenance areas, and warehouses. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

11. What is the current commercial expenditure for FACILITIES to support this system? Consider training facilities, maintenance areas, and warehouses. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

12. What is the current DoD expenditure for MAINTENANCE capability and capacity in support of this system? Include planning, tasks, and support equipment for I and D levels. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

13. What is the current commercial expenditure for MAINTENANCE capability and capacity in support of this system? Include planning, tasks, and support equipment for I and D levels. (Rate from 1 to 10, with 10 the highest investment).

10 9 8 7 6 5 4 3 2 1

SYSTEM STABILITY: The following questions address the degree of system/ sub-system design stability and reliability. Grading may depend on the type of system - mechanical or electronic. System stability will affect the possibility for technological insertion and reliability improvements.

14. Is there any DoD incentive to improve/change the system design for this diesel engine? (Select 10 if high incentive; select 1 if no incentive. Consider degree of tech change, reliability, and stability.)

10 9 8 7 6 5 4 3 2 1

15. Is there any commercial incentive to improve/change the system design for this diesel engine? (Select 10 if high incentive, select 1 if no incentive. Consider degree of tech change, reliability, and stability.)

10 9 8 7 6 5 4 3 2 1

Comments/Suggestions:
16. Click in the box to enter text: _____

APPENDIX D - BVOI SYSTEM DEFINITION

BVOI System Definition		
Element	**System Under Review**	**Same or Similar System Currently Supported**
	AN/SLQ-32A(V)2 LPD-17	**32A(V)2 DDG,DD,FFG,LPD**
System Description: LPD-17 AN/SLQ-32A(V)2 APLs: 00016175CL, 00031094, 00024151, 00013994, 00031092, 00023775, 00023050, 00037242, 57040535, 00031331, 00037240, 00024155, 00024141, 00022148, 59226866, 00016197, 81022070, 00031090, 00016185, 00016170 ,75531124, 00027898, 00030155, 00030156, 00030157, 00030158, 00030159, 00033021, 00034224	The SLQ-32(V) is part of the ship's self defense. It provides a quick reaction combat capability. This system provides electronic warfare support and electronic attack data. The A(V)2 provides coverage with improvements in system sensitivity, angle detection, processing, and reliability. The system mission: 1. detect and identify threat weapon systems and launch platform emitters, 2. provide threat info to ship's weapon systems with suitable bearing accuracy, 3. control MK36 Decoy Launching System, 4. interface with SSDS, SLA-10B, ship and navigation, command and control.	Same
Percent of NSN Commonality	Approx. 50%	same
Departure from Commercial Std. (%)	n/a	n/a
Physical Characteristics:		
Weight:	8,121 Lbs. (DRY)	same
Cube:	Roughly 1,050 Cu. Ft.	same
Dimensions:	Varies per unit (17 units in system)	same
Existing ALS Opportunities		

BVOI System Definition		
Element	**System Under Review**	**Same or Similar System Currently Supported**
	AN/SLQ-32A(V)2 LPD-17	**32A(V)2 DDG,DD,FFG,LPD**
Statutory Requirements:		OPNAV Instruction 5200
(Safety, Environmental, HAZMAT, Misc.)		
Population:		
Navy:	4 (4 ships/1system ea)	39 (37 ships/1 system ea +2 school sites)
Commercial:	n/a	n/a

BVOI System Definition		
Element	**System Under Review**	**Same or Similar System Currently Supported**
	LPD-17 Engine	**LSD-41 Engine**
System Description: LSD-41 engine APLs: L030131177 L013130011 882192137 L030131178 L016021522 882242177 L030131179 L016021524 212102377 L032010142 L016200501 213190058 L053990014 L016320331 271080290 L174031941 L016320332 452200031 L290090005 L701110501 480100082 L400062013 L701110502 480100083 L665360264 L759990487 482030020 L665360265 L789990380 615500354 L665360266 L882096632 615500433 L665360267 L882142599 615500847 L882142600 L882242152 759990484 L882242178 L929990212 882057576 L665360277 L665360278 L665360280 L665360279	The LPD-17 propulsion system has four Fairbanks-Morse-Pielstick PC2.5 STC, 16-cylinder sequentially turbocharged diesels, two shafts, 40,350 shaft h/p (total ship) and two five-blade Controllable Pitch Propellers. As a unit, the engine consists of an engine block containing all power producing components. The cylinder block and crankcase comprise the main framework of the diesel engine unit, which includes internal and external parts. LPD engines are built with a two-piece, forged steel and aluminum piston.	The LSD-41 propulsion system has four Fairbanks-Morse Pielstick 2.5, 16-cylinder turbocharged diesels, two shafts, 33,000 shaft h/p (total ship) and two five-blade Controllable Pitch Propellers. As a unit, the engine consists of an engine block containing all power producing components. The cylinder block and crankcase comprise the main framework of the diesel engine unit, which includes internal and external parts. LSD vessels were built with a one-piece cast iron piston, no longer produced.
Percent of NSN Commonality	Approx. 70%	Approx. 90% (LSD-48 to 49)
Departure from Commercial Std. (%)	n/a	Approx. 30%
Physical Characteristics:		
Weight:	185,200 Lbs. (DRY)	181,100 Lbs. (DRY)
Cube:	Roughly 4200 Cu. Ft.	Roughly 4500 Cu. Ft.
Dimensions:	L 27' - 4" x W 12' - 4 1/2" x H 12' - 3 1/2"	L 28' - 8" x W 12' - 1 3/4" x H 12' - 8"
Existing ALS Opportunities		
Statutory Requirements:		OPNAV Instruction 5200
(Safety, Environmental, HAZMAT, Misc.)		

BVOI System Definition		
Element	**System Under Review**	**Same or Similar System Currently Supported**
	LPD-17 Engine	**LSD-41 Engine**
Population:	FMED manufactured	FMED manufactured PC2/PC2.5 engines:
Navy:	50 (12 ships/4 engines ea) + 2 test site	52 (12 ships/4 engines ea +2 test site+ 2 Battle Spares)
Commercial:	n/a	48 Marine, 68 Stationary

APPENDIX E - BVOI SURVEY COVER LETTERS

You have been selected to participate in a government survey that will be used to evaluate the **AN/SLQ -32 Electronic Warfare System**. This survey is in the form of an on-line questionnaire. This questionnaire is part of a Best Value Opportunity Index (BVOI) which will be used to identify alternative logistic support opportunities for systems/subsystems on the LPD 17 class. The attached Excel spread sheet contains the system definition for the AN/SLQ-32. This information is provided for your reference. A quick review of the system definition sheet should help you with the questionnaire.

1. Access the system definition sheet by double clicking on this link -

2. Access the questionnaire by double clicking on this link - http://163.249.62.17/slq32/slq32.htm

This survey will only take a few minutes of your time. Please submit your response by Friday, January 26. We ask you to forward this email to anyone who may be knowledgeable on the AN/SLQ-32 system.

Thank you in advance for your cooperation.

Jan Marinaro LPD 17 Team - Systems Analyst

You have been selected to participate in a government survey that will be used to evaluate **the Main Propulsion Diesel Engine (MPDE)**. This survey is in the form of an on-line questionnaire. This questionnaire is part of a Best Value Opportunity Index (BVOI) which will be used to identify alternative logistic support opportunities for systems/sub-systems on the LPD 17 class. The attached Excel spreadsheet contains the system definition for the MPDE. This information is provided for your reference. A quick review of the system definition sheet should help you with the questionnaire.

1. Access the system definition sheet by double clicking on this link -

2. Access the questionnaire by double clicking on this link - http://163.249.62.17/mpde/mpde.htm

This survey will only take a few minutes of your time. Please submit your response by Friday, January 26. We ask you to forward this email to anyone who may be knowledgeable on the MPDE system.

Thank you in advance for your cooperation.

Jan Marinaro LPD 17 Team - Systems Analyst

APPENDIX F - MPDE PET MATRIX

Performance Metrics
Medium Speed Main Propulsion Diesel Engine ≥5000 BHP

Characteristic	*Government*	*Commercial-Cruise Ships*	*Commercial-Freighter*	*Differences & Observations*
Readiness	- Stated goal - Measured by 3M data system. - Budget constrained. LSD 41 Class MPDE A(o) averages 80-85%. - A(o) is calculated by Uptime/total time	- At reasonable dollar cost. - Not directly measured by ship owner/operator. Readiness based upon ability to get underway…customer satisfaction	- Similar to cruise industry	- Navy uses redundant systems and different operating procedures that prevent direct A(o) comparison with commercial activities. - Readiness is important to all but not uniformly measured.
System Related Performance Improvements	- Focused on maintenance improvements vice system performance/operating improvements - R&D not actively incentivized - Navy improvement notification and technical approval process is inefficient	- Focus on operating cost savings; fuel consumption rate, lube oil consumption rate, emissions quality - R&D is incentivized - OEM communication is facilitated by Tech Bulletins & Website access.	- Similar to cruise industry	- Commercial facilitates OEM R&D system improvements…motivated by profit - Navy approval processes, readiness objectives and unique maintenance rqmts do not leverage from OEM R&D efforts

Medium Speed Main Propulsion Diesel Engines ≥5000 BHP

Characteristic	*Government*	*Commercial-Cruise Ships*	*Commercial-Freighter*	*Differences & Observations*
Ship mission and operation methodology	- Variable schedule - Operates in support of amphibious assault missions including open ocean transits, littoral operating areas, multiple ports	- Constant schedule - Focused on providing hotel services for profit - Requires high degree of reliability to ensure ability to get underway and sustain services	- Most consistent schedule - Cargo movement from port to port	- Commercial has most stable operation practices - Different missions/similar readiness requirements
Annual Diesel Operation Hours (AOH)	- 2000 hours	- 6000 hours (Gulf/Ocean Ships)	- 4,500 hours Great Lakes - 6,000 hours Gulf/Ocean Ships	- USN AOH is significantly less.
Life Span of Ship	- 40 Years (with modernization)	- 20 to 30 years (hotel facilities investment make modernization economical)	- 20 years (more economical to buy a new ship)	- Navy plans longer ship life
Speed	- Variable speed in support of amphibious operations	- Variable speeds depending upon cruise line operating areas	- Consistent speed between loading ports.	- Speed is a function of missions
Percent of operating time at slow speed (Idle-6 Knots)	40%	30%	5%	- USN operates at slower speeds
Percent of operating time at	40%	10%	0%	- USN operates at medium

Characteristic	***Government***	***Commercial-Cruise Ships***	***Commercial-Freighter***	***Differences & Observations***
medium speed (7-12 Knots)				speed longer
Percent of operating time at fast speed (13+ Knots)	20%	60%	95%	- Commercial primarily operates at higher speeds
Average number of shafts	2	2	1	
Average number of engines per ship	4	4 or more	2	
Average number of engines per shaft	2	2	2	
Major overhaul milestone	- Target: 20,000 operating hours - Actual: 16,000 to 20,000	- Target: 40,000 operating hours - Actual: 20,000	- Target: 40,000 operating hours - Goal: 50,000 operating hours - Actual: 25,000 to 30,000	- USN plans overhauls earlier than commercial - Actual overhauls occur closer to 20,000et
Operation Methodology - Engine Usage	- East Coast typically uses 2 to 4 engines @ 35%-40% loaded configuration - West Coast typically uses 1, 2, & 4 engines @ 90%-100% loaded. (Variable operations)	- All engines fully loaded when underway - Lower loads during frequent maneuvering evolutions. In port operations dictate long idle modes.	- All engines fully loaded about 90% of the time. - Shut down in port.	- Operation methodologies vary between all ships and locations. - Diesel engine is designed to be most efficient when fully loaded.
Maintenance Philosophy - Organizational Level Profile	- Intense/structured training - Formalized PMS process - Corrective	- Minimal maintenance training and performance by ship's crew. - PMS for warranty purposes	- Similar to cruise industry	- Navy places greater emphasis on O-level maintenance

Characteristic	***Government***	***Commercial-Cruise Ships***	***Commercial-Freighter***	***Differences & Observations***
	maintenance ability	- Use of sensors for diagnostic purposes		
Percent of O-level Repair Parts	20 %	5%	5%	
Maintenance Philosophy - ***Intermediate Level Profile***	- I-level activities located in Norfolk, San Diego and Sasebo - Repair philosophy differs by location	- No defined I-level - Combined I- and D-level OEM/third-party support only	- Similar to cruise industry	- USN uses extensive and established organic infrastructure. - Commercial solely relies on OEM/contractors
Percent of I-level Repair Parts	50%	N/A	N/A	
Maintenance Philosophy - ***Depot Level Profile***	- Uses both organic and OEM support	- Combined Intermediate and Depot level OEM/third-party support only	- Similar to cruise industry	- OEM/third-party has primary role
Percent of D-level Repair Parts	30%	95%	95%	
Facilities: (to include repair activities at I / D levels)	- Extensive worldwide facility infrastructure equipped to handle all readiness issues.	- OEM worldwide accessibility	- Similar to cruise industry	- Commercial has little direct investment in facilities…acquired as needed
Modernization: (to include System Engineering considerations)	- Formalized and methodical - Complex modernization process	- Informal and less methodical - OEM provides tech bulletins & performs overhauls - Uses condition-based	- Similar to cruise industry	- USN shifting to condition-based maintenance philosophy - USN opportunity to streamline modernization process

Characteristic	***Government***	***Commercial-Cruise Ships***	***Commercial-Freighter***	***Differences & Observations***
		maintenance		
Supply Support: ***(to include PHS&T)***	- Provisioning Process - Established PHS&T - Readiness driven - DLRs in long supply - Established repair pipeline - Sophisticated OBRP selection - DLA awarded corporate contracts for consumable items	- No provisioning process - No PHS&T - Minimal OBRPs - Nonexistent repair pipeline…no rotatable pool assets - OEM identifies OBRPs	- Similar to cruise industry	- OEM is supply support manager for commercial - USN uses sophisticated readiness based drivers and PMS process
Training:	- OJT is constant - High personnel turnover - Formal schooling provided to lower graded personnel [A school, C school] - New ship construction courses - SCN LBES training - Factory training	- OJT is constant - Stable personnel - Generic and less formal schools begin at a high grade. - Merchant Marine Academies - Commercial Trade Schools - Factory training	- Similar to cruise industry	- Commercial has less structured training - Personnel are more experienced due to low turnover
Tech Data:	- Operation and maintenance manuals	- Operation and maintenance manuals	- Similar to cruise industry	- Commercial has less structured documentation

Characteristic	*Government*	*Commercial-Cruise Ships*	*Commercial-Freighter*	*Differences & Observations*
	with IPB - Drawing packages - PMS - EOSS - SSR - COSAL	with IPB - Drawing packages - OEM Web sites - Interactive databases - OEM Service Bulletins		- Commercial depends on access to OEM data vice owning and maintaining data
Test and Support Equipment:	- Borescope - Sensors - Special tools - Some rigging - OBT - LBES (engine room)	- Borescope - Leader in use of sensors technology - Special tools - Extensive rigging - OBT	- Borescope - Minimal user of monitoring sensors - Special tools - Extensive rigging - OBT - OEM has mockup of engine only	- Similar specialized tools - Sensor technology will facilitate better maintenance practices - Commercial has OEM engine available for testing - USN has integrated engine room mock up at LBES

APPENDIX G- INDUSTRY RESEARCH WEBSITES

http://www.imart.org/
A collection of search engines, directories, and databases to aid in market research.

http://www.cadv.org/
Disseminates information to enable exchanges of questions and answers and to share best practices and lessons learned.

http://govcon.com
http://www.industrylink.com
Hundreds of links to companies grouped by technology.

http://bigbook.com
Yellow pages of 16 million U.S. businesses.

http://switchboard.com
Business search engine.

http://www.techweb.com
More than 100 links